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EXAMINER

HORNING, JOEL G

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1792

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ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

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DETAILED ACTION

Status of Application

1. By amendment filed September 11th, 2009, Claims 3 and 11-19 have been cancelled and Claims 1, 2, 4, 6, 7 and 9 have been amended. Claims 1, 2 and 4-10 are currently pending.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
2. **Claim 1, 2 and 4** are rejected under 35 U.S.C. 103(a) as being unpatentable over Nonaka (JP-04120900, as shown by the Derwent English abstract) in view of Brennan (US 2716462, hereafter referred to as "the '462 patent").

Nonaka is directed towards a method for stiffening a speaker diaphragm by coating it with a polymer layer. In the process, a liquid solution (70% toluene) of a polymer is spray coated (**claim 2**) onto both faces of the polymer diaphragm of a

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speaker. The polymer is then cured by exposure to UV light (**claim 4**). Nonaka does not teach having a creased area that surrounds a central area of the diaphragm with different amounts of polymer deposited at these two parts of the speaker diaphragm.

However, the '462 patent is also directed towards methods of stiffening speaker diaphragms by supplying a coating to the diaphragm (col 1, lines 15-31). It further teaches that the diaphragm has a central area (body area) which is surrounded by an area (rim area) that can have creases (corrugations) in order to increase the flexibility of that area. These two areas are taught to have their own separate stiffness requirements, which are met by applying different amounts of polymer reinforcement at different places on the diaphragm (using "radial filaments") so that the diaphragm will have both the proper strength in its creased area to support the body and the required flexibility in the center section in order to properly vibrate as a speaker (col 1, line 70 through col 2, line 19).

Thus, it would have been obvious to a person of ordinary skill in the art at the time of invention to use a diaphragm with a central area surrounded by a creased area as taught by the '462 patent in the process of Nonaka in order to improve the flexibility of the diaphragm.

Furthermore, because the reinforcement requirements of these two areas are taught to be separate with the required stiffness being created by the amount of the polymer reinforcement applied to each area, it would have been obvious to a person of ordinary skill in the art at the time of invention to then provide these separate areas with different amounts of liquid plastic material reinforcement in order to be able to produce

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the required strength in the creased area and the required flexibility in the center area in order to have an effective speaker (**claim 1**).

3. **Claims 5, 7 and 8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Nonaka (JP-04120900, Derwent English abstract) in view of Brennan (US 2716462, hereafter referred to as “the ‘462 patent”) as applied to claim 1 above, further in view of Kishima (US 4668588).

Nonaka teaches using a UV curable liquid polymer solution which includes a solvent (toluene) to form polymeric layer, but does not discuss removing the solvent before curing the polymer layer.

However, Kishima is also directed towards using UV curable polymer solutions (UV curable paint) in order to form polymeric layers (paint layers) (abstract). It teaches that after the liquid polymer layer is deposited the solvent should be removed, by heating the layer for some time, before UV curing (col 5, lines 45-58) in order to improve the surface properties of the resulting polymer layer (col 6, lines 7-12).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to heat the deposited liquid polymer layer for some time before UV curing it in order to remove the solvent from the layer and produce a cured polymer layer with better surface properties (**claim 5**).

4. Regarding **claim 7**, as indicated by Kishima, the waiting time (drying time) is a result effective variable for determining the degree of drying (for a given solvent, volume of solvent and temperature). Additionally, drying time is also a result effective variable

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for determining the length of the coating process. Shorter drying times result in a faster process, but may not dry the coating sufficiently. Thus, it would have been obvious to one of ordinary skill in the art at the time of invention to choose the instantly claimed ranges of “between 1 and 15 seconds” through process optimization, since it has been held that when the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980). Additionally, this indicates that this chosen optimal processing time would be different than the optimal processing time for a process with a different processing parameters (e.g. a different amount of solvent or temperature).

5. **Claim 8** further requires that greater waiting times be used for a roughened surface than a smooth surface. Nonaka in view of the ‘462 patent shows that it is obvious to have different coating thicknesses on the speaker. As applied to claim 7 in its previous rejection, Kishima teaches that the waiting time (drying time) is a result effective variable. Thus, it would have been obvious to one of ordinary skill in the art at the time of invention to choose the instantly claimed ranges of “greater than the waiting time in the case of a membrane having a smooth surface” through process optimization, since it has been held that when the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980) (**claim 8**).
6. **Claims 6 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Nonaka (JP-04120900, Derwent English abstract) in view of Brennan (US 2716462,

hereafter referred to as “the ‘462 patent”) further in view of Brennan (US 2408038, hereafter referred to as “the ‘038 patent”).

Claim 6 further requires that a membrane or the device for applying the liquid plastic be moved during application of the liquid plastic.

Nonaka teaches spraying the liquid plastic onto the speaker membrane, but does not describe exactly how that operation occurs.

However, the ‘038 patent is also directed towards spraying liquid polymers (binder) (col 2, lines 49-52) onto speaker diaphragms (col 1, lines 6-9). It teaches that one suitable way of doing this is by placing the membrane on a turntable and rotating it (as can be seen in figure 4, the turntable is symmetrical about the diaphragm’s central axis, so it will rotate on the central axis) while spraying the liquid polymer on the membrane. By spraying the coating this way, a substantially uniform coating is produced (col 5, lines 14-20).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to rotate the membrane during spraying in order to produce a more controlled uniform coating of the membrane (**claim 6**).

Furthermore, the ‘038 patent teaches performing multiple layer deposition steps in order to produce the desired film thickness and to enable the deposition of more complex thickness profiles (masking) (col 5, lines 21-32).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to deposit the desired film thickness on the membrane by performing a succession of layer deposition steps (deposit and cure one polymer

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layer and then deposit and cure another layer) instead of a single step since it was a known way to deposit layer of the desired thickness and would produce predictable results and in order to enable the formation of more complicated thickness profiles on the rotating membrane (**claim 10**).

7. **Claims 9 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over Nonaka (JP-04120900, Derwent English abstract) in view of Brennan (US 2716462, hereafter referred to as “the ‘462 patent”) further in view of Bozak (US 3093207).

Claim 9 further requires that the thickness ratio of the deposited layer and the membrane be between 0.5:1 and 3:1.

Nonaka does not appear to teach what the thickness ratio should be. However, Bozak is also directed towards methods for coating speaker diaphragms with polymer layers in order to stiffen the diaphragm (col 2, lines 22-53). Bozak further teaches that the ratio of the thickness of the deposited layers and the membrane will effect the resonance of the diaphragm. The ratio should be high enough to produce the desired stiffening of the diaphragm to dampen undesirable internal vibrations, but small enough not to dampen out desired sounds (col 1, lines 23-33 with col 2, line 65 to col 2, line 11). Put another way this ratio is a result effective variable for determining the desired acoustics of the speaker diaphragm. The ratio should be large enough to dampen undesired sounds, while small enough not to dampen the desired ones.

Thus, it would have been obvious to one of ordinary skill in the art at the time of invention to choose the instantly claimed ranges of “between 0.5:1 and 3:1”

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through process optimization, since it has been held that when the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980) (**Claim 9**).

8. Regarding **claim 10**, Nonaka does not appear to teach depositing multiple polymer layers onto the membrane. However, Bozak teaches that the polymer layer should be applied to both sides (twice) of the membrane in order to produce the best acoustics (col 2, lines 33-45).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to apply the liquid plastic to the diaphragm and cure it a number of times (coat one side of the diaphragm and repeat the coating process on the other side of the diaphragm) in order to produce the best acoustics (**claim 10**).

9. **Claim 10** is also rejected under 35 U.S.C. 103(a) as being unpatentable over Nonaka (JP-04120900, Derwent English abstract) in view of Brennan (US 2716462, hereafter referred to as “the ‘462 patent”).

Claim 10 further requires that the liquid plastic coating process be repeated a number of times. Nonaka discloses the claimed invention except for repeating the coating process a number of times. It would have been an obvious matter of design choice to repeat the coating process a number of times, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

Response to Arguments

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10. Applicant's arguments with respect to claims 1, 2 and 4-10 have been considered but are not convincing in view of the new ground(s) of rejection necessitated by amendment. Applicant's arguments are drawn to the newly amended features, so they have already been considered in the rejection above.
11. Though applicant argues on page 6 of their remarks that Nonaka in view of Brennan '462 does not teach the newly claimed features of claim 1. However, as discussed in the rejection above, '462 does further teach including creases in the area surrounding the central area of the diaphragm in order to improve the flexibility of the diaphragm. The other limitations of new claim 1 were previously rejected in the previous (now cancelled) claim 3 by Nonaka in view of Brennan, so it is obvious to further include to the art used to reject the previous (now cancelled) claim 3 a creased area surrounding the central area of the diaphragm in order to increase the flexibility of the diaphragm, which meets current claim 1. The applied combination of Nonaka in view of Brennan '462 does teach all of limitations and render claim 1 obvious.

Conclusion

12. No current claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL G. HORNING whose telephone number is (571) 270-5357. The examiner can normally be reached on M-F 9-5pm with alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael B. Cleveland can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. G. H./
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792